particularly the alkaline salts. It is immediately obvious that much misuse of these therapeutic potentialities has taken place in my experience, as well as in the hands of others. With too small a dose no beneficent neutralization is accomplished, while the attendant secondary rise in acidity rarely fails to assert itself. When too large a dose is employed one risks paralyzing the digestion for a considerable period, following which there appears a hyperacidity of even greater degree than the one we undertook to combat. The combination of slowly acting, with more rapid alkalies, is desirable. Atropin has a restricted use and should be employed only as a desiccating agent in instances of hypersecretion.

The use of fractional doses of the alkalies distributed over the course of digestion is the most efficient and physiological method for the employment of these agencies; for this purpose magnesium oxide is the most dependable and best suited salt.

Based upon these studies it seems very questionable whether prolonged use of the alkalies leads to any permanent diminution of the acid secretion of the stomach; in fact, it is as likely that the opposite effect is produced.

A lasting relief of hyperacidity is not to be sought in antacid medication, nor in olive oil or atropin. It is more likely to be found in the proper regulation and restriction of dietary errors as well as in the general control of the hygiene and manner of living of each individual patient under our professional care.

RELAPSING FEVER ENDEMIC IN COLORADO.*

By James J. Waring, M.D.,
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When peace is declared the returning flood tide of Americans whom the business of war has called to foreign shores will bring with it necessarily the menace of new diseases now rare or perhaps unknown in the United States. At this time, when the wave of humanity is still moving toward the other side, it is desired to report a case of relapsing fever, a disease all too common in Europe but exceedingly rare in this country.

The following case is important not only for its own sake, because of its rarity, but because the infection was contracted undoubtedly in the same locality as Meader's cases, reported two years ago.

At the Annual Meeting of the Colorado State Medical Society, October 5, 1915 Meader[1] presented clinical histories of 5 cases of relapsing fever, in 2 of which he had found the spirochete. This

* Read before the Medical Society, City and County of Denver, October 13, 1917.

most valuable observation represented the first report of this disease in Colorado. Neither before nor since have any other cases been recorded in this State. Indeed it is many years since relapsing fever has been proved beyond question in American residents of the United States, although it has been found in a few instances among recently arrived immigrants.

Todd[2] says the disease is not endemic in North America. Osler[3] mentions its occurrence in epidemic form in New York and Philadelphia in 1869, adding—"since when it has not reappeared."

Carlisle[4] in reporting 2 cases of relapsing fever in May, 1906, writes—"there are no other cases on record in this country up to the present time in which Sp. obermeieri has been found in the blood." The origin of one of his cases (an Englishman and ship steward) was undoubtedly tropical America. The other was a case of accidental infection of a laboratory worker (the joint author of a paper[5] on this subject in the same journal) from an inoculated monkey. The geographical data incorporated in this paper of Carlisle are most complete.

Clymer[6] credits the Irish immigrants with bringing the disease to Philadelphia in 1844, all of the 15 cases under his care crossing the ocean in the same vessel. A. Dulbois[7] reported a study of 15 cases in 1848. Austin Flint[8] published a lecture in 1870 based on his experiences with the disease in the wards of Bellevue Hospital. To his article was appended a statistical report of 103 cases by T. J. Moore.[9]

The disease appeared in epidemic form in New York in 1869 and continued throughout the year and the next, gradually disappearing in 1871. This outbreak was confined chiefly to Philadelphia and New York, although a few cases were found in Washington, in Maryland, in New Jersey and in Connecticut. One case was imported into Boston as noted in the American translation of Strümpell's work on the *Practice of Medicine*.[10]

In September, 1874, a severe epidemic[11] was observed at Oroville, California, among chinese laborers. This epidemic resembled both *typhus exanthematicus*, or ordinary typhus fever, and *typhus recurrentis*, or relapsing fever. It was probably the latter, but there is no conclusive evidence, as Obermeier[12] did not publish his observations until 1873, although he found spirochetes in the blood of a patient in 1868.

Ward[13] reports a case in an Armenian in Worcester, Mass., in 1899. However suggestive clinically, the diagnosis was not confirmed by the blood examination.

It will then be noted that until Meader's cases were placed on record there were no instances that I have been able to find of this disease with the spirochete demonstrated in the blood originating in the United States among native Americans.

Meader concluded his paper in 1915 as follows: "These cases are

reported for the purpose of calling attention to the existence of this disease in Colorado so that the members of this Society may be

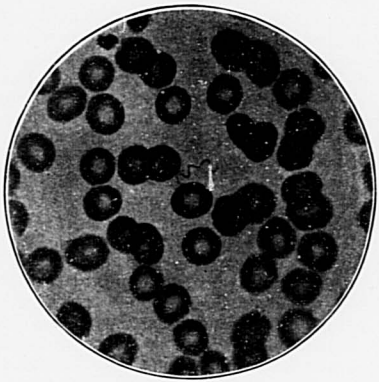

FIG. 1.—Spirochete in the blood. (Meader's case.)

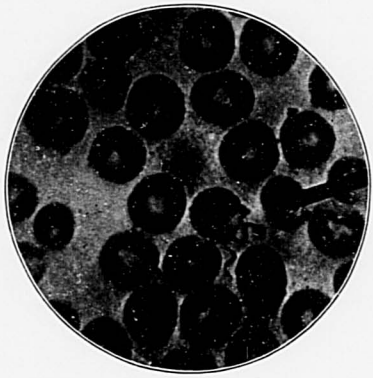

FIG. 2.—Spirochete in the blood. (Waring's case.)

especially on the watch for it to determine if this be only a sporadic accidental outbreak or if we have an endemic focus."

The case whose clinical history follows is placed on record as proving beyond doubt the presence of such an endemic focus in or near Bear Creek Cañon, Colorado.

The patient, a native American, was a boy, aged twelve years. His father has been ill for the past three years with pulmonary tuberculosis and is now an arrested case. The boy himself was examined two years ago by A. C. Foster and G. B. Gilbert, of Colorado Springs, and by them considered to have a slight glandular and pulmonary infection. While under my care this past winter he showed definite evidences of tuberculosis. He came to Colorado July, 1915, and has not been out of the State since except from October 1, 1916, to October 25, 1916, when visiting in Kansas City. He resided in Colorado Springs continuously from his arrival, and saving only for this above-mentioned visit, until he came to Denver, March 12, 1917. July 6 to July 9 he spent at Lake Wellington near Buffalo Park. From August 1 to August 7 he was at Troutdale, Bear Creek Cañon, returning to Denver on the latter date and was taken sick August 12. As the incubation period rarely exceeds eight days the infection must have been contracted at Troutdale.

On Sunday, August 12, the boy was drowsy and disinclined to play. On August 13, he had a chill in the early morning and temperature rapidly rose to 104°. On August 14 it went to 105.2°. By August 16 it had returned to normal. I saw him first on August 13. He was torpid, skin very sallow—almost icteric, eyes bright, cheeks flushed, a herpetic eruption on his upper lip, tongue coated, breath heavy, and complaining bitterly of headache and pains through the back and legs. He also had pain and tenderness over the spleen which was markedly enlarged. The liver was not notably increased in size, nor were heart and lung findings different from former examinations. Bowels were constipated, he had vomited twice and did so repeatedly during this attack and subsequent paroxysms. I might note here that the spleen was palpable throughout his illness but increased considerably in size during the paroxysms, becoming smaller but still palpable in the intervals.

WHITE BLOOD COUNTS.

	8/14	8/24	8/31	9/4	9/10
White cells	6400	7200	9000	8200	12,900
Polymorphonuclears	..	57	62	58	69
Large lymphocytes	..	15	13	2	7
Small lymphocytes	..	11	18	40	23
Transitionals	..	15	7	0	1
Eosinophiles	..	2	0	0	0
Basophiles	..	0	0	0	0
Absolute lymphocyte count	..	1872	2790	3280	3870

In spite of the acute onset typhoid fever was considered a possibility, this suspicion being warranted more or less on the grounds of an enlarged spleen and a leukopenia. The Widal test and blood

culture were both negative and as these reports came in from the laboratory the first crisis occurred, the temperature falling rapidly with moderate sweating to normal. With the subsidence of fever, appetite returned and the malaise disappeared as if by magic. I confess to being puzzled by the return of fever on August 20. On this day he had a hard session with the dentist in the morning, with gradually rising fever in the afternoon. The lung findings were as before except for the presence of deep-seated, distant, subcrepitant rales scattered over the right back and heard only after cough. In this connection Hagler[14] writes that fine moist rales were found in the chest frequently throughout the first few days of the febrile period. There was no cyanosis, pulse 120, eyes and reflexes normal. The spirochetes—probably Spironema novyi were found by my associate in the laboratory, Dr. Ward Burdick, searching at my suggestion, during the second attack. They were overlooked at the first paroxysm but found in these slides on careful subsequent examination.

There was an absence of the urinary findings noted by Meader. I refer to the appearance and disappearance with the paroxysms of a considerable amount of albumin and large numbers of fine hyaline casts. Albumin was found only during the fourth paroxysm.

The differential and total white blood counts are tabulated. Meader calls attention to a rise in the transitionals during the attack and a slightly increased white count and fairly normal differential count during the interval, with corresponding inverse variations in the polymorphonuclear neutrophiles. The counts in this case were made at irregular times in relation to the paroxysm so that deductions are difficult, but it would appear on careful study that Meader's findings are not altogether borne out. One fact is strikingly evident. There is a steady increase in the absolute lymphocyte count. In this connection it will be recalled that Novy and Knapp,[15] who with Gabritschewsky[16] contributed much to the study of immunity in this disease, consider the role of the mononuclear phagocytes most important in the ingestion of dead and enfeebled spironemata under the influence of immune bodies.

The third paroxysm came on August 29, after three days of fever to as high as 99° with the crisis on August 31. There was then an interval of nine days with temperature to 99° or slightly over before the next paroxysm. That the boy was not well during the second and third intervals was evident from the fact that his spleen was still palpable and that he had an occasional elevation of temperature to 99° or slightly over.

Seven days after the third attack there began a mild febrile movement, the high daily point being from 99° to 99.5°. The crisis with fever to 104° plus came on September 9, with normal temperature again on September 11. Exactly seven days after the subsidence of this attack, or on September 17, the temperature was 98.1° at

7 A.M.; at noon it was 99.5°; by 4.30 P.M. it had risen to 110.8° and by 10 P.M. was just short of 105°. Four hours later, or at 2 A.M., of September 18, the temperature was 98.2° and it has remained within normal limits ever since. The patient, somewhat thin and weak after his illness but otherwise in excellent condition, was kept in bed until twelve days had elapsed without fever before permitting him to get up, it having been the general experience[17] that if this interval elapses without a paroxysm none is likely to occur.

DISCUSSION. As transmitting agents bed-bugs, head-lice, body-lice, ticks, fleas and biting flies have all been suspected. Flügge, in 1891, was probably the first to suggest the possibility that vermin might convey relapsing fever in Europe. "Only once have spirochetes been transmitted by the bites of bed-bugs" says Todd. He thinks this was not a true transmission by inoculation but the spirochetes were carried mechanically on the mouth parts of the bugs.

Cuthbert Christy,[18] in India, in 1902, allowed himself to be bitten without becoming infected by bed-bugs caught in the bed of a patient ill with relapsing fever.

Noguchi[19] in a recent exhaustive consideration of sporochetes says: "in the case of *Spironema recurrentis* both body-lice and bed-bugs may be infected by sucking the blood of a patient suffering from the European relapsing fever, but the lice alone can transmit the disease to the next person they bite. Bed-bugs are never known to spread the infection by their bites, although by crushing the infected bugs directly over a minute skin trauma (scratch, etc.), a person may become infected." Breinl and Kinghorn,[20] among others, failed in their attempt to transmit spirochetosis by bugs.

Hagler[21] is inclined to ascribe to the bed-bug a definite and more important role. From a large experience in Serbia he has the following observations to make: Typhus and relapsing fever appeared coincidently in Serbia, and the same preventive measures were effective against both. Typhus fever practically disappeared as the lice were exterminated but relapsing fever persisted until fumigation of rooms and wards with sulphur was undertaken to destroy the bed-bugs, after this it disappeared. Of 50 Red Cross surgeons and nurses at least 20 contracted typhus while none developed relapsing fever. Typhus is admittedly conveyed by the louse and probably more nurses and doctors were bitten by lice than by bed-bugs. These latter have been shown to harbor the *Spironema recurrentis* for as long as sixty days[22] but as noted above, according to Noguchi and other investigators they do not transmit the disease.

The *Pediculus corporis* carries European relapsing fever, but even as close a relative as *Pediculus capitis* has been shown by Gonder[23] to be incapable of spreading the disease, although its body may contain the organisms.

Robledo[24] thinks *Argas americanus* is the tick responsible for the spreading of *Spironema novyi* in Columbia, but this needs confirmation.

Hagler says the tick in Serbia could be excluded as a vector because of its rarity.

In conversation with Dr. Meader I learned of certain ideas of Prof. Theo. D. A. Cockerell, of the University of Colorado, as regards the biting fly as a transmitting agent. The following facts I obtained through Prof. Cockerell. There occurs during the summer months in the mountains of Colorado a powerful biting fly, by name *Symphoromyia*. This fly is found also in the mountainous districts of Europe where relapsing fever occurs. The localities where certain genera are found are as follows:

S. atripes. Rabbit Ear Pass—Long's Peak Trail on way from Long's Peak Inn.

S. hirta. Marshall Pass, 10,856 feet. Long's Peak Trail, on way from Long's Peak Inn. Webber Ranch—between Ward and Allen's Park.

S. pullata. "Colorado."

S. trivittata. "Colorado."

Prof. Cockerell also sent me sketches of the wings of the buffalo gnat and the *symphoromyia*. It is highly improbable that these flies have anything to do with the transmission of this disease. I have been able to find little information on them as possible vectors. Nuttall[25] tried for a long time unavailingly in England to convey the *Trypanosoma brucei* by means of the genus of biting flies called Stomoxys. Schuberg and Kuhn,[25] however, record a successful transmission of relapsing fever by Stomoxys.

How did the disease enter Colorado? It is not only possible but perhaps probable that the band of gypsies mentioned by Meader, that stopped in Bear Creek Cañon at the tent where Meader's patients resided left behind certain undesirable visitors in the form of infected body-lice. Granted this, it follows that the descendants of these pediculi either retained infecting ability from the summer of 1915, until the summer of 1917, a very remote possibility, or other unrecognized cases have come and gone and the said descendants have had opportunity for receiving their infecting store of spirochetes. In any case it seems beyond doubt proved that an endemic form of relapsing fever has been established in Colorado.

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A VACCINE FOR THE TREATMENT OF BRONCHIAL ASTHMA: REPORT OF TWENTY CASES.[1]

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The work of Auer and Lewis, Meltzer, Vaughan, Babcock and others leaves little doubt that the disease so long known as bronchial or idiopathic asthma has been permanently removed etiologically from the neuroses, and is now fully explained as a manifestation of protein sensitization. The paroxysmal outbursts represent anaphylactic shock and the various causes formerly thought to act reflexly, and whose removal often resulted in cure, are now believed to be foci from which the foreign material necessary to induce an attack is elaborated.

Judging from the widely diversified nature of the exciting causes of asthmatic seizures it would seem probable that the specific poison either occurs in a number of forms or is common to a great variety of plants and animals as well as bacteria. Moreover, from our understanding of the conditions underlying sensitization it is evident that an immunity could be produced provided the specific protein was capable of being isolated in an available form and

[1] Read before the Nineteenth Annual Meeting of the Tri-State Medical Society, at Durham, N. C.